What is claimed is:

1. An excimer or molecular fluorine laser system, comprising:

a discharge chamber filled with a laser gas mixture at least including a halogen-containing molecular species and a buffer gas and including a window comprising $MgF_2$;

a plurality of electrodes within the discharge chamber connected to a discharge circuit for energizing the gas mixture; and

a resonator for generating a laser beam,

wherein said $MgF_2$ window is oriented such that the crystallographic c-axis of the $MgF_2$ material is at least approximately parallel to a beam path through the $MgF_2$ window so that ordinary and extraordinary components are refracted approximately a same amount and traverse approximately a same beam path through the window.

2. The laser system of Claim 1, wherein said discharge chamber comprises a second $MgF_2$ window oriented such that the crystallographic c-axis of the $MgF_2$ material is at least approximately parallel to a beam path through the second $MgF_2$ window.

3. The laser system of Claim 2, wherein each of said $MgF_2$ windows includes a pair of at least approximately parallel surfaces oriented at least approximately at Brewster's angle to said beam path through said $MgF_2$ windows, and wherein each said $MgF_2$ window has been previously cleaved along a predetermined plane, such that when said surfaces of said windows are oriented at Brewster's angle to the beam paths, then their crystallographic c-axes are approximately parallel to the beam paths.

4. The laser system of Claim 1, wherein said $MgF_2$ window includes a pair of approximately parallel surfaces oriented approximately at Brewster's angle to said beam path through said $MgF_2$ window, and wherein said $MgF_2$ window has been previously cleaved along a predetermined plane, such that when said surfaces of said window are

oriented approximately at Brewster's angle to the beam path, then its crystallographic c-axis is approximately parallel to the beam path.

5. The laser system of Claim 4, further comprising a partially reflecting output coupler comprising an $MgF_2$ substrate oriented such that the crystallographic c-axis of the $MgF_2$ material of the output coupler is at least approximately parallel to a beam path through said output coupler.

6. The laser system of Claim 5, wherein said $MgF_2$ substrate of said output coupler includes a pair of at least approximately parallel surfaces oriented at least approximately normal to said beam path through said output coupler, and wherein said $MgF_2$ substrate has been previously cleaved along a predetermined plane, such that when said surfaces of said substrate are normally oriented to the beam path, then its crystallographic c-axis is approximately parallel to the beam path through the output coupler.

7. The laser system of Claim 4, further comprising a highly reflecting (HR) mirror comprising an $MgF_2$ substrate oriented such that the crystallographic c-axis of the $MgF_2$ material of the HR mirror is at least approximately parallel to a beam path through said substrate of said mirror prior to reflection at a reflecting surface of said mirror.

8. The laser system of Claim 7, wherein said $MgF_2$ substrate of said HR mirror includes a pair of at least approximately parallel surfaces oriented at least approximately normal to said beam path through said substrate of said HR mirror, and wherein said $MgF_2$ substrate of said HR mirror has been previously cleaved along a predetermined plane, such that when said surfaces of said substrate of said mirror are normally oriented to the beam path, then its crystallographic c-axis is approximately parallel to the beam path through the substrate of said mirror.

9. The laser system of Claim 4, further comprising a prism comprising $MgF_2$ oriented such that the crystallographic c-axis of the $MgF_2$ material of the prism is at least approximately perpendicular to a beam path through said prism.

10. The laser system of Claim 9, wherein said prism includes an entrance face and an exit face, and wherein said prism has been previously cleaved along a predetermined plane, such that when said beam traverses said prism, then its crystallographic c-axis is approximately perpendicular to the beam path through the prism.

11. The laser system of Claim 1, further comprising a partially reflecting output coupler comprising a $MgF_2$ substrate oriented such that the crystallographic c-axis of the $MgF_2$ material of the output coupler is at least approximately parallel to a beam path through said output coupler.

12. The laser system of Claim 11, wherein said $MgF_2$ substrate of said output coupler includes a pair of at least approximately parallel surfaces oriented at least approximately normal to said beam path through said output coupler, and wherein said $MgF_2$ substrate has been previously cleaved along a predetermined plane, such that when said surfaces of said substrate are normally oriented to the beam path, then its crystallographic c-axis is approximately parallel to the beam path through the output coupler.

13. The laser system of Claim 11, further comprising a highly reflecting (HR) mirror comprising an $MgF_2$ substrate oriented such that the crystallographic c-axis of the $MgF_2$ material of the HR mirror is at least approximately parallel to a beam path through said substrate of said mirror prior to reflection at a reflecting surface of said mirror.

14. The laser system of Claim 13, wherein said $MgF_2$ substrate of said HR mirror includes a pair of at least approximately parallel surfaces oriented at least

approximately normal to said beam path through said substrate of said HR mirror, and wherein said $MgF_2$ substrate of said HR mirror has been previously cleaved along a predetermined plane, such that when said surfaces of said substrate of said mirror are normally oriented to the beam path, then its crystallographic c-axis is approximately parallel to the beam path through the substrate of said mirror.

15. The laser system of Claim 13, further comprising a prism comprising $MgF_2$ oriented such that the crystallographic c-axis of the $MgF_2$ material of the prism is at least approximately perpendicular to a beam path through said prism.

16. The laser system of Claim 15, wherein said prism includes an entrance face and an exit face, and wherein said prism has been previously cleaved along a predetermined plane, such that when said beam traverses said prism, then its crystallographic c-axis is approximately perpendicular to the beam path through the prism.

17. The laser system of Claim 11, further comprising a prism comprising $MgF_2$ oriented such that the crystallographic c-axis of the $MgF_2$ material of the prism is at least approximately perpendicular to a beam path through said prism.

18. The laser system of Claim 17, wherein said prism includes an entrance face and an exit face, and wherein said prism has been previously cleaved along a predetermined plane, such that when said beam traverses said prism, then its crystallographic c-axis is approximately perpendicular to the beam path through the prism.

19. The laser system of Claim 1, further comprising a highly reflecting (HR) mirror comprising an $MgF_2$ substrate oriented such that the crystallographic c-axis of the $MgF_2$ material of the HR mirror is at least approximately parallel to a beam path through said substrate of said mirror prior to reflection at a reflecting surface of said mirror.

20. The laser system of Claim 19, wherein said $MgF_2$ substrate of said HR mirror includes a pair of at least approximately parallel surfaces oriented at least approximately normal to said beam path through said substrate of said HR mirror, and wherein said $MgF_2$ substrate of said HR mirror has been previously cleaved along a predetermined plane, such that when said surfaces of said substrate of said mirror are normally oriented to the beam path, then its crystallographic c-axis is approximately parallel to the beam path through the substrate of said mirror.

21. The laser system of Claim 19, further comprising a prism comprising $MgF_2$ oriented such that the crystallographic c-axis of the $MgF_2$ material of the prism is at least approximately perpendicular to a beam path through said prism.

22. The laser system of Claim 21, wherein said prism includes an entrance face and an exit face, and wherein said prism has been previously cleaved along a predetermined plane, such that when said beam traverses said prism, then its crystallographic c-axis is approximately perpendicular to the beam path through the prism.

23. The laser system of Claim 1, further comprising a prism comprising $MgF_2$ oriented such that the crystallographic c-axis of the $MgF_2$ material of the prism is at least approximately perpendicular to a beam path through said prism.

24. The laser system of Claim 23, wherein said prism includes an entrance face and an exit face, and wherein said prism has been previously cleaved along a predetermined plane, such that when said beam traverses said prism, then its crystallographic c-axis is approximately perpendicular to the beam path through the prism.

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25. An excimer or molecular fluorine laser system, comprising:

a discharge chamber filled with a laser gas mixture at least including a halogen-containing molecular species and a buffer gas;

a plurality of electrodes within the discharge chamber connected to a discharge circuit for energizing the gas mixture; and

a resonator for generating a laser beam including a partially reflecting output coupler, and

wherein said output coupler comprises an $MgF_2$ substrate oriented such that the crystallographic c-axis of the $MgF_2$ material of the output coupler is at least approximately parallel to a beam path through said output coupler.

26. The laser system of Claim 25, wherein said $MgF_2$ substrate of said output coupler includes a pair of at least approximately parallel surfaces oriented at least approximately normal to said beam path through said output coupler, and wherein said $MgF_2$ substrate has been previously cleaved along a predetermined plane, such that when said surfaces of said substrate are normally oriented to the beam path, then its crystallographic c-axis is approximately parallel to the beam path through the output coupler.

27. The laser system of Claim 25, further comprising a highly reflecting (HR) mirror comprising an $MgF_2$ substrate oriented such that the crystallographic c-axis of the $MgF_2$ material of the HR mirror is at least approximately parallel to a beam path through said substrate of said mirror prior to reflection at a reflecting surface of said mirror.

28. The laser system of Claim 27, wherein said $MgF_2$ substrate of said HR mirror includes a pair of at least approximately parallel surfaces oriented at least approximately normal to said beam path through said substrate of said HR mirror, and wherein said $MgF_2$ substrate of said HR mirror has been previously cleaved along a predetermined plane, such that when said surfaces of said substrate of said mirror are

normally oriented to the beam path, then its crystallographic c-axis is approximately parallel to the beam path through the substrate of said mirror.

29. The laser system of Claim 27, further comprising a prism comprising $MgF_2$ oriented such that the crystallographic c-axis of the $MgF_2$ material of the prism is at least approximately perpendicular to a beam path through said prism.

30. The laser system of Claim 29, wherein said prism includes an entrance face and an exit face, and wherein said prism has been previously cleaved along a predetermined plane, such that when said beam traverses said prism, then its crystallographic c-axis is approximately perpendicular to the beam path through the prism.

31. The laser system of Claim 25, further comprising a prism comprising $MgF_2$ oriented such that the crystallographic c-axis of the $MgF_2$ material of the prism is at least approximately perpendicular to a beam path through said prism.

32. The laser system of Claim 31, wherein said prism includes an entrance face and an exit face, and wherein said prism has been previously cleaved along a predetermined plane, such that when said beam traverses said prism, then its crystallographic c-axis is approximately perpendicular to the beam path through the prism.

33. An excimer or molecular fluorine laser system, comprising:

a discharge chamber filled with a laser gas mixture at least including a halogen-containing molecular species and a buffer gas;

a plurality of electrodes within the discharge chamber connected to a discharge circuit for energizing the gas mixture; and

a resonator for generating a laser beam including a highly reflecting (HR) mirror, and

wherein said HR mirror comprises an $MgF_2$ substrate oriented such that the crystallographic c-axis of the $MgF_2$ material of the HR mirror is at least approximately parallel to a beam path through said substrate of said mirror prior to reflection at a reflecting surface of said mirror.

34. The laser system of Claim 33, wherein said $MgF_2$ substrate of said HR mirror includes a pair of at least approximately parallel surfaces oriented at least approximately normal to said beam path through said substrate of said HR mirror, and wherein said $MgF_2$ substrate of said HR mirror has been previously cleaved along a predetermined plane, such that when said surfaces of said substrate of said mirror are normally oriented to the beam path, then its crystallographic c-axis is approximately parallel to the beam path through the substrate of said mirror.

35. The laser system of Claim 33, further comprising a prism comprising $MgF_2$ oriented such that the crystallographic c-axis of the $MgF_2$ material of the prism is at least approximately perpendicular to a beam path through said prism.

36. The laser system of Claim 35, wherein said prism includes an entrance face and an exit face, and wherein said prism has been previously cleaved along a predetermined plane, such that when said beam traverses said prism, then its crystallographic c-axis is approximately perpendicular to the beam path through the prism.

37. An excimer or molecular fluorine laser system, comprising:

a discharge chamber filled with a laser gas mixture at least including a halogen-containing molecular species and a buffer gas;

a plurality of electrodes within the discharge chamber connected to a discharge circuit for energizing the gas mixture; and

a resonator for generating a laser beam including a prism, and

wherein said prism comprises $MgF_2$ oriented such that the crystallographic c-axis of the $MgF_2$ material of the prism is at least approximately perpendicular to a beam path through said prism.

38. The laser system of Claim 37, wherein said prism includes an entrance face and an exit face, and wherein said prism has been previously cleaved along a predetermined plane, such that when said beam traverses said prism, then its crystallographic c-axis is approximately perpendicular to the beam path through the prism.

39. An excimer or molecular fluorine laser system, comprising:

a discharge chamber filled with a laser gas mixture at least including a halogen-containing molecular species and a buffer gas;

a plurality of electrodes within the discharge chamber connected to a discharge circuit for energizing the gas mixture; and

a resonator for generating a laser beam including an optical component comprising $MgF_2$, and

wherein said optical component comprising $MgF_2$ has been previously cleaved along a predetermined plane, such that the refractive indices of the birefringent $MgF_2$ material for orthogonal polarization components of the beam are at least approximately equal so that the polarization of the beam is not substantially reduced due to the influence of the birefringent nature of the $MgF_2$ material.

40. The laser system of Claim 39, wherein the crystallographic c-axis of the $MgF_2$ material of said optical component is oriented at least approximately parallel to a beam path through the optical component.

41. The laser system of Claim 40, wherein the optical component is selected from the group consisting of a window on the discharge chamber, an output coupler and a highly reflective (HR) mirror.

42. The laser system of Claim 39, wherein the crystallographic c-axis of the $MgF_2$ material of said optical component is oriented at least approximately perpendicular to a beam path through the optical component.

43. The laser system of Claim 42, wherein the optical component is a prism.

44. An excimer or molecular fluorine laser system, comprising:

a discharge chamber filled with a laser gas mixture at least including a halogen-containing molecular species and a buffer gas;

a plurality of electrodes within the discharge chamber connected to a discharge circuit for energizing the gas mixture; and

a resonator for generating a laser beam including a prism, and

wherein said prism comprises $MgF_2$ oriented such that the crystallographic c-axis of the $MgF_2$ material of the prism is at least approximately parallel to a beam path through said prism so that ordinary and extraordinary components are refracted a substantially same amount and traverse a substantially same beam path through the window.

45. The laser system of Claim 44, wherein said prism includes an entrance face and an exit face, and wherein said prism has been previously cleaved along a predetermined

plane, such that when said beam traverses said prism, then its crystallographic c-axis is approximately parallel to the beam path through the prism.

46. An excimer or molecular fluorine laser system, comprising:

a discharge chamber filled with a laser gas mixture at least including a halogen-containing molecular species and a buffer gas;

a plurality of electrodes within the discharge chamber connected to a discharge circuit for energizing the gas mixture; and

a resonator for generating a laser beam including an optical component comprising $MgF_2$, and

wherein said optical component comprising $MgF_2$ has been previously cleaved along a predetermined plane, such that the refractive indices of the birefringent $MgF_2$ material for orthogonal polarization components of the beam are different by at least approximately a maximum amount, and the resonator is configured to reject at least a portion of one of the polarization components, so that the polarization of the beam is not substantially reduced due to the influence of the birefringent nature of the $MgF_2$ material.

47. The laser system of Claim 46, wherein the polarization is increased due to the birefringence of the $MgF_2$ component, its being cleaved along said predetermined plane, and the configuration of the resonator to reject at least said portion of said one or said polarization components.

48. The laser system of Claim 47, wherein the crystallographic c-axis of the $MgF_2$ material of said optical component is oriented at least approximately perpendicular to a beam path through the optical component.

49. The laser system of Claim 48, wherein the optical component is selected from the group consisting of a window on the discharge chamber and a prism.

50. The laser system of Claim 46, wherein the crystallographic c-axis of the $MgF_2$ material of said optical component is oriented at least approximately perpendicular to a beam path through the optical component.

51. The laser system of Claim 50, wherein the optical component is a prism.

52. An excimer or molecular fluorine laser system, comprising:

a discharge chamber filled with a laser gas mixture at least including a halogen-containing molecular species and a buffer gas and including a window comprising $MgF_2$;

a plurality of electrodes within the discharge chamber connected to a discharge circuit for energizing the gas mixture; and

a resonator for generating a laser beam, and

wherein said window comprising $MgF_2$ has been previously cleaved along a predetermined plane, such that the refractive indices of the birefringent $MgF_2$ material for orthogonal polarization components of the beam are different by at least approximately a maximum amount, and the resonator is configured to reject at least a portion of one of the polarization components, so that the polarization of the beam is not substantially reduced due to the influence of the birefringent nature of the $MgF_2$ material.

53. The laser system of Claim 52, wherein the polarization of the beam is increased due to the birefringence of the $MgF_2$ window, its being cleaved along said predetermined plane, and the configuration of the resonator to reject at least said portion of said one or said polarization components.

54. The laser system of Claim 53, wherein the crystallographic c-axis of the $MgF_2$ material of said window is oriented at least approximately perpendicular to a beam path through the window.